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ABSTRACT

This handbook contains nutritional information for athletic coaches and others who provide this information and guidance to high school and college students. The purposes of the handbook are to review briefly the content of a sound basic diet and to analyze theories and practices that would relate to nutrition and athletic performance. The handbook provides information in the following four groupings: a) basic nutritional needs of young athletes, with accompanying dietary recommendations; b) general considerations of nutrition and diet during periods of athletics training; c) special problems relating to eating and drinking before, during, and following athletic events; and d) examination and evaluation of nutritional claims made by dietary supplements for use by athletes. (BRB)

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NUTRITION FOR ATHL

A HANDBOOK FOR COACHES

American Association for Health, Physical Education, and Recreation
1201 Sixteenth Street, N.W., Washington, D.C. 20036

SP006 367

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THE AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION, AND RECREATION
1201 Sixteenth Street, N.W., Washington, D.C. 20036

AAHPER, a national affiliate of the National Education Association, is a professional association of over 50,000 members serving all levels of education and the community. AAHPER membership is concerned with physical education, dance, health education and school nursing, athletics, safety education, recreation, outdoor education, and programs of professional preparation for leadership in these areas. Its School Health Division and Division of Men's Athletics recognize that the benefits of competitive sports experiences are assured only if the various health aspects are kept in focus. Publication of this book has been co-sponsored by the National Council of Secondary School Athletic Directors, National Council of State High School Coaches Association, and U.S. Collegiate Sports Council.

THE AMERICAN DIETETIC ASSOCIATION
620 North Michigan Avenue, Chicago, Illinois 60611

The American Dietetic Association, founded in 1917, has as its objectives to improve the nutrition of human beings; to advance the science of dietetics and nutrition; and to promote education in these and allied areas. Dietitians and nutritionists are members of this professional association which has established educational standards and post-baccalaureate education as minimum requirements for membership.

THE NUTRITION FOUNDATION, INC.
99 Park Avenue, New York, N.Y. 10016

The Nutrition Foundation was organized by food and related manufacturers in December 1941 as a sincere expression of their interest in scientific progress and human health. The basic purposes of the Foundation are: (1) the development of a comprehensive program of fundamental research, providing basic information in the science of nutrition; and (2) the support of educational measures that will assist in making the science of nutrition effective in the lives of present and future generations.

TO THE CO

This handbook is written for athletic coaches and others who provide nutritional information and guidance to young athletes. The contents have been assembled in response to a need expressed by athletic directors and coaches. The need has become more critical with growing evidence of the relation of diet to health and of health to the performance of the human body. The coach is now serving as a counselor on dietary practice even more than in the past.

It is logical for students to turn to their athletic coach for nutritional guidance as they prepare for specific sports and athletic events. He epitomizes, for them, a strong motivating force toward their athletic goals. Thus, the coach bears responsibility for understanding the basic principles of nutrition and for translating these for students, particularly as they apply to athletic performance.

The purpose of the handbook is thus twofold:

1. To review briefly the content of a good basic diet, which should be the foundation of all eating patterns
2. To analyze, in particular, current theories and practices as they relate to nutrition and athletic performance.

Nutritional research has made great progress in establishing the nutrient needs of human beings and in interpreting these needs in terms of common foods. But in spite of the growth of sound nutritional principles, many faddish, unsound, and even dangerous dietary practices have sprung up. Some of these apply to the diet of athletes in training, and many practices

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are well entrenched. In some cases they have persisted despite the fact that their validity has long since been disproved. In other cases, research to probe their soundness is incomplete or inconclusive. In preparing this booklet, a serious effort has been made to examine and assess critically the major research studies conducted in this country with a view to arriving at sound, practical procedures for feeding young athletes. Translated references of research done abroad related to food intake and athletic performance were also reviewed.

Application is made here largely to the teenage period, a wide span which covers junior and senior high school and the early college years. However, general principles are relevant beyond the teens as well.

Contents of the handbook appear under four major subject groupings:

1. Basic nutritional needs of teenage athletes, with accompanying dietary recommendations
2. General considerations of nutrition and diet during periods of athletic training
3. Special problems relating to eating and drinking before, during, and after athletic events
4. Examination and evaluation of nutritional claims made for dietary supplements which are promoted for the use of athletes.

SECTION I NUTRITIONAL CONDITIONING

What do coaches tell their athletes about eating and its effect on performance? A recent survey of practices of high school coaches throughout the country revealed a wide variety of dietary recommendations. The majority of coaches surveyed based their nutritional recommendations on their own athletic experience. Few consulted a physician, dietitian, or public health nutritionist for advice.

In some sports, the tendency was for coaches to say nothing about nutrition. Coaches generally were not concerned about the diets of athletes participating in such sports as baseball, golf, and skiing. They may have relied on the fact that a diet with sufficient variety which meets recommended nutritional standards is usually adequate when sports do not make extraordinary demands on the individual.

But does the young athlete know enough about nutrition to select such a diet without help? Does the average teenager know what the recommended nutritional and dietary standards are?

Leaving young athletes to their own devices dietwise may mean the difference between their having enough stamina and tiring halfway through a game, between a sense of well-being and a feeling of not up to par. It can make the difference between winning and losing. Factors other than food, of course, are responsible for good or poor performances, but taking nutrition for granted can lead to unnecessary handicaps.

Too frequently, the coach makes generalizations regarding what to eat. He tells his athletes to "stick to a sensible diet," "no snacking," "no rich

foods," "no pop," and "no fried foods." Or they are told to "eat a nutritious diet," "eat a balanced diet," or "cut down on fat." Or they are told "no milk, no pork, no beans or cabbage, no cake or pastries," and so goes the list.

Without further specific explanation, the young athlete does not really know what foods to eat or how much.

The coach is missing an excellent opportunity to educate when he fails to give sound nutritional advice as part of the training program. His athletes are at a peak moment of "educability" about dietary requirements when they are highly motivated to improve their performance during the athletic season. The coach should not rely on his own experience, on publicity accounts of what other coaches are doing, or on his own hunches about diet.

Presented in this booklet is basic information about foods and dietary requirements, as well as more specific details about the dietary requirements of athletes. This material will give the coach the facts he needs to recommend what and how much teenage athletes should eat.

GUIDELINES FOR NUTRITIONALLY SOUND DIETS

Nutritional conditioning starts the day one is conceived. The amounts and kinds of foods one eats affect the ultimate size, strength, and stamina one achieves. From nutritional research has come a body of knowledge on the nutriment needs of people of different ages and conditions, and thus a scientific basis exists for planning nutritionally sound diets. The guidelines set up for such planning are the Recommended Daily Dietary Allowances developed by the Food and Nutrition Board, National Academy of Sciences-National Research Council (see page 9).

Food selection is simplified and clarified by combining into groups those foods which are comparable enough in calories, protein, minerals, and vitamins to be interchangeable. These food groups are thus more than lists of calories; they are organized according to their equivalent nutritional values, and substitution or exchange *within* each group is permitted. Table

I provides details regarding foods in each of the food groups. An appropriate and varied diet is achieved by selecting foods from each group.

Foods in each group are expressed in easily measured units, permitting simplicity in planning meals, purchasing food, selection of food and in teaching.

For example, the unit of measure for the meat group is one ounce. Thus, one ounce of meat is comparable to one ounce of fish or poultry; 1 slice of cheese; one egg; or two tablespoons of peanut butter. One ounce of the foods in this group contains about 75 calories, 7 grams protein, 5 grams fat, and approximately the same amounts of minerals and vitamins of the B complex. If 3 ounces of cooked meat are eaten (not including bone or fat), this food group will contribute about 225 calories and 21 grams of protein in addition to good amounts of the B complex vitamins and iron.

The citrus fruit group includes items that approximate 40 calories and contain 40 or more milligrams of vitamin C. The serving again is stated as a measure, ½ cup, so the student can learn what size serving is needed to meet the prescribed daily vitamin C requirement.

Dark green, leafy and deep yellow vegetables are noted separately to assure reliable sources of vitamin A. Again, the cup measure is used to give the student an idea of what a serving is.

The milk group provides not only protein of high quality but also B complex vitamins, vitamin A, calcium, and other minerals.

The proper food intake of the athlete is the starting point in training or conditioning. Table 2 shows the minimum daily food lineup, based on food groups which offer all the necessary protein, minerals, and vitamins, as well as economy, variety, and flexibility. It can be adjusted to fit individual caloric needs, family menus, or training meal patterns.

The food groups listed in the minimum daily food lineup form the foundation of the diet recommended for young athletes. This plan serves as the nucleus for meals both in and out of athletic seasons. There is a vast

leeway in the choice of the foods within each of the food groups. The diet is flexible enough to adapt to an almost unlimited range of conditions and circumstances. Major deviations for athletes from these food groups should rarely be necessary, in light of growing recognition that basic nutritional needs of athletes and nonathletes do not differ except for caloric needs. A scientifically acceptable eating pattern is important for both groups the year around. (Some of the special considerations for athletes, particularly the facts on certain nutritional misconceptions, are in Section II.) These food groups were selected since the food groups and menus used throughout the book needed more explanation than the commonly used "Basic Four."

ESSENTIAL FOOD GROUPS

Milk
Meat (fish, poultry, cheese, or eggs)
Dark green or deep yellow vegetables
Citrus fruits
Other fruits and vegetables
Bread (enriched or whole grain bread, cereal, or potatoes)
Fats (butter, margarine, or other fat spreads)

TABLE 1

FOOD GROUPS

Foods within a group can be *substituted* or *exchanged* for each other.

MILK

(1 cup whole milk contains 12 grams carbohydrate, 8 grams protein, 10 grams fat, and 170 calories; 1 cup of skim milk contains 80 calories; 1 cup cocoa made with milk contains approximately 200 calories)

1 cup whole milk
1 cup skim milk
½ cup evaporated milk
¼ cup powdered milk
1 cup buttermilk
1 cup cocoa

MEAT GROUP

(1 ounce contains 7 grams protein, 5 grams fat, and 75 calories)

1 ounce lean beef, lamb, pork, liver, chicken*
1 ounce fish — cod, haddock, perch, etc.
1 hot dog
¼ cup tuna, salmon, crab, lobster
5 small oysters, shrimp, clams
3 medium sardines
1 slice cheese
¼ cup cottage cheese
1 egg
2 tablespoons peanut butter

* 1 average serving of meat or fish (such as a pork chop or 2 meatballs) is about 3 ounces

---

DARK GREEN OR DEEP YELLOW VEGETABLES (½ cup is one serving)

Greens and lettuce have very little carbohydrate content. The other vegetables contain approximately 7 grams carbohydrate and 2 grams protein and 35 calories

Broccoli*
Carrots
Chicory*
Escarole*
Pepper
Pumpkin
Tomatoes*
Watercress*
Winter squash

Greens:*
Beet greens
Chard
Collard
Dandelion
Kale
Mustard
Spinach
Turnip greens
Lettuce*

* Low Calorie Vegetables.

CITRUS FRUITS OR SUBSTITUTE (½ cup is one serving)
The carbohydrate is averaged to approximately 10 grams per ½ cup and 40 calories

Orange	Grapefruit juice*	Tangerine
Orange juice	Cantaloupe*	Tomato juice*
Grapefruit*	Strawberries*	

* Represents low calorie fruits and vegetables

OTHER FRUITS AND VEGETABLES

Fruits (½ cup is approximately 10 grams carbohydrate and 40 calories)

Apple	Dates	Peach
Applesauce	Figs	Pear
Apricots	Grapes	Pineapple
Banana (½ small)	Grape juice (¼ cup)	Plums
Raspberries	Honeydew melon	Raisins (2 tablespoons)
Blueberries	Mango	Pineapple juice (⅓ cup)
Cherries	Papaya	Prunes (2 medium)
		Watermelon*

Vegetables (½ cup is one serving)
The vegetables without the asterisk contain approximately 7 grams carbohydrate, 2 grams protein, and 35 calories

Asparagus*	Cucumbers*	Radishes*
Beets	Eggplant*	Rutabagas
Brussels sprouts*	Mushrooms*	Sauerkraut*
Cabbage*	Okra*	String beans*
Cauliflower*	Onions	Summer squash*
Celery*	Peas, green	Turnips

* Represents low calorie fruits and vegetables

BREAD GROUP
(1 slice of bread or 1 substitute contains 15 grams carbohydrate, 2 grams protein, and 70 calories)

½ hamburger bun	½ cup spaghetti, noodles, macaroni, etc.	⅔ cup parsnips
½ hot dog bun	2 graham crackers	1 small potato
1 cup popcorn	5 saltines	½ cup mashed potato
2½" wedge pizza	6 round, thin crackers	15 potato chips—1 ounce bag
1 slice enriched bread	½ cup beans or peas (dried or cooked) (Lima or navy beans, split pea, cowpeas, etc.)	6 pretzels, medium, or 20 thin sticks
1 biscuit or roll	¼ cup baked beans	8 French fries
1 small muffin	⅓ cup corn	¼ cup sweet potato or yams
1 small piece cornbread		1½" cube sponge or angel cake (no icing)
½ cup cooked cereal		½ cup ice cream (omit 2 fat servings)
¾ cup ready-to-eat cereal		
½ cup rice or grits		

FAT GROUP
(1 teaspoon fat contains 5 grams fat and 45 calories)

Bacon	1 slice	Cream cheese	1 tablespoon
Butter or margarine or fat spread	1 teaspoon	French dressing	1 tablespoon
		Mayonnaise	1 teaspoon
Cream (light)	2 tablespoons	Oil or cooking fat	1 teaspoon
Cream (heavy—40%)	1 tablespoon		

DESSERTS
(see Snacks & Desserts, page 19)

SUGARS

(1 teaspoon contains	Sugar	Syrup
5 grams carbohydrate and	Jelly	Hard candy
20 calories)	Honey	Carbonated beverage (¼ cup)

Salt used in the home should be iodized.

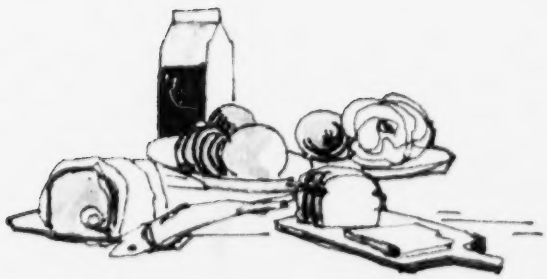


TABLE 2

MINIMUM DAILY FOOD LINEUP (Approximately 2,500 calories)

Food Group	*Total Servings Per Day*
Milk	4 cups
Meat (fish, poultry, cheese or eggs)	5 ounces of edible meat without bone or fat
Dark green or deep yellow vegetables	1 serving (½ cup)
Citrus fruits	1 serving (½ cup)
Other fruits and vegetables	2 servings (1 cup)
Bread (enriched or whole grain bread, cereal, or potatoes)	13 servings *
Fats (butter, margarine, or other fat spreads)	10 servings (10 teaspoons)

* *If additional calories are needed by the active young person, servings of bread or substitutes may be increased. Extra calories will be obtained in desserts, sugar, snacks, and simple sweets.*

e.g. 500 calories — Cookies — 5 that are 3 inches in diameter

200 calories — Plain cake 3 by 2 by 1½ inches

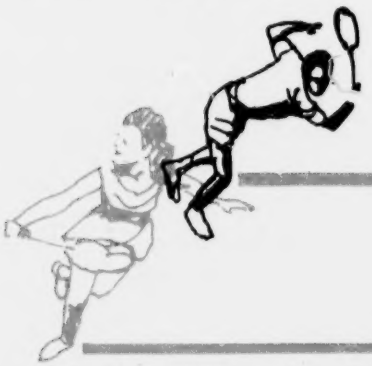
300 calories — Malted milk — 1 cup

* *Revised 1968*

CALORIC REQUIREMENTS

The total amount of food recommended for the athlete depends on his caloric requirements. And how is this determined?

The "Recommended Daily Dietary Allowances"* established by the National Academy of Sciences shows the calorie requirements, *for moderate activity,* for age groups, with average weights and heights, as follows:



	Age Years	Weight Pounds	Height Inches	Calories
BOYS				
	10-12	77	55	2500
	12-14	95	59	2700
	14-18	130	67	3000
	18-22	147	69	2800
GIRLS				
	10-12	77	56	2250
	12-14	97	61	2300
	14-16	114	62	2400
	16-18	119	63	2300
	18-22	128	64	2000

These caloric requirements are based on moderate activity. This means that extra calories are needed to maintain body weight of athletes in training and during competition.

Another way to estimate the caloric requirements of the student is to use the following formula:

..... X ..... = ...

desirable weight calories per pound calories per day

1. Determine the desirable weight (from growth chart shown above or other authoritative source).
2. Multiply weight by calories required per pound per day, as follows.

Age in years	Calories per pound per day	
	BOYS	GIRLS
10-12	32	29
12-14	24	23
14-18	23	21
18-22	19	19

3. The result is the amount of calories required each day to maintain the desirable weight.

Note, again, that the resulting figure is the number of calories needed to maintain desired weight with moderate activity. The number of calories recommended per day would increase with additional activity, such as during the training season.

If the student is overweight, he needs fewer calories per day. If he is underweight, he needs more calories per day.

For most people, standard height and weight statistics can serve as a partial guide for desirable weight. However, a trained athlete may weigh more than the tables indicate for an average individual, but his weight may be due to a higher proportion of muscle rather than fat. Placing him on a reducing diet would be a mistake.

Underweight, if there is no physical reason, may be due to inadequate caloric intake. A spurt of growth in height in a teenager may also account for an otherwise unexplained weight loss. A physical check should be made by a physician.

HELPING THE ATHLETE KEEP SCORE

How does the young athlete know if he is eating the right things in the right amounts? Until he keeps a daily record, he probably does not realize exactly how much he consumes. Each teenager should be encouraged to "keep score" until he knows the details of his diet and can tell where his food habits need improvement.

Shown on the following pages are examples of "one-day meal record" and "food scoreboards." The meal record can be used at any age. The figures for the scoreboards vary for different caloric totals and are designed to be used by boys and girls of varying ages. Different scoreboards should also be used if the athlete wishes to gain or lose weight.

ONE-DAY MEAL RECORD

1. Write down what you eat at each meal and between meals.
2. Look at the food group list in Table I to identify each food.
3. Record food quantities in the food groups column.

EXAMPLE

Breakfast

	Milk	Meat	Veg.	Citrus	Other fruit	Bread	Fat
½ cup orange juice				1			
1 egg		1					
2 slices buttered toast						2	2
1 cup cocoa	1						

4. Transfer total scores to your "Food Scoreboard."

	FOOD GROUPS							
MEAL	**Milk (cups)**	**Meat Group (servings)**	**Dark Green or Deep Yellow Vegetables (servings)**	**Citrus Fruits (servings)**	**Other Fruits and Vegetables (servings)**	**Bread Group and Substitutes (servings)**	**Butter, Margarine or Fat (servings)**	**Other Foods like Desserts, Candy, Soft Drinks, Snacks**
Breakfast								
Mid-morning snack								
Lunch								
Afternoon snack								
Dinner								
Evening snack								
TOTALS								

FOOD SCOREBOARD (Approximately 2,250 calories)

Girls 10-12

To Score: *Use the totals on your one-day meal record*

Recommended Foods	Minimum Goal *	My Score
Milk	4 cups	
Meat (fish, poultry, cheese, or eggs)	5 ounces	
Dark green or deep yellow vegetables	1 serving (½ cup)	
Citrus fruit or substitute	1 serving (½ cup)	
Other fruits and vegetables	2 servings (1 cup)	
Bread (enriched or whole grain bread, cereal, or potatoes)	10 servings	
Fats (butter, margarine, or other fat spreads)	7 teaspoonsful	
Other foods, such as plain desserts, sugar, or jelly carbonated beverages, ades, and snacks	1 small serving	

Take a look at your score. You may find that you have been leaving out important foods, and if so, you need to start including them. Or you may find that you have been taking too many "empty" calories such as carbonated beverages and candy.

Foods to Add	Foods to Cut Down On

* The amounts of each food, except milk, dark green or deep yellow vegetables, citrus fruit, and other fruits and vegetables, are guidelines. A person knowledgeable in nutrition and in food content can adapt these servings of food so as to obtain the same approximate calories and nutritive value.

FOOD SCOREBOARD (Approximately 2,700 ca

To Score: *Use the totals on your one-day meal record*

Recommended Foods	Minimum Goal *
Milk (2% fat content)	4 cups
Meat (fish, poultry, cheese or eggs)	5 ounces
Dark green or deep yellow vegetables	1 serving (½ cup)
Citrus fruit	1 serving (½ cup)
Other fruits and vegetables	3 servings (1½ cup)
Bread (enriched or whole grain bread, cereal, or potatoes)	16 servings
Fats (butter, margarine, or other fat spreads)	10 teaspoons
Other foods, such as plain desserts, sugar, or jelly carbonated beverages, ades, and snacks	1 small serving

Take a look at your score. You may find that you have b portant foods, and if so, you need to start including them. Or yo have been taking too many "empty" calories such as carbonated b

Foods to Add	Foods to C

mately 2,250 calories)

Girls 10-12

record

Goal *	My Score
	_____
	_____
(½ cup)	_____
(½ cup)	_____
s (1 cup)	_____
gs	_____
nsful	_____
erving	_____
	_____

nd that you have been leaving out Im-cluding them. Or you may find that you uch as carbonated beverages and candy.

Foods to Cut Down On

_____
_____
_____
_____
_____

content can adapt these servings of food so as to obtain the same approximate calories and nutritive value.

FOOD SCOREBOARD (Approximately 2,700 calories)

Boys 12-14

To Score: Use the totals on your one-day meal record

Recommended Foods	Minimum Goal *	My Score
Milk (2% fat content)	4 cups	_____
Meat (fish, poultry, cheese or eggs)	5 ounces	_____
Dark green or deep yellow vegetables	1 serving (½ cup)	_____
Citrus fruit	1 serving (½ cup)	_____
Other fruits and vegetables	3 servings (1½ cup)	_____
Bread (enriched or whole grain bread, cereal, or potatoes)	16 servings	_____
Fats (butter, margarine, or other fat spreads)	10 teaspoons	_____
Other foods, such as plain desserts, sugar, or jelly carbonated beverages, ades, and snacks	1 small serving	_____
		_____

Take a look at your score. You may find that you have been leaving out Important foods, and if so, you need to start including them. Or you may find that you have been taking too many "empty" calories such as carbonated beverages and candy.

Foods to Add	Foods to Cut Down On
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

FOOD SCOREBOARD (Approximately 3,000 calories)

Boys 14-18

To Score: *Use the totals on your one-day meal record*

Recommended Foods	Minimum Goal *	My Score
Milk (2% fat content)	4 cups	_____
Meat (fish, poultry, cheese or eggs)	7 ounces	_____
Dark green or deep yellow vegetables	1 serving (½ cup)	_____
Citrus fruit	1 serving (½ cup)	_____
Other fruits and vegetables	3 servings (1½ cup)	_____
Bread (enriched or whole grain bread, cereal, or potatoes)	18 servings	_____
Fats (butter, margarine, or other fat spreads)	10 teaspoons	_____
Plain dessert, sugar, or jelly, snacks, carbonated beverages, ades, etc.	2 small servings	_____ _____

Take a look at your score. You may find that you have been leaving out important foods, and if so, you need to start including them. Or you may find that you have been taking too many "empty" calories such as carbonated beverages and candy.

Foods to Add	Foods to Cut Down On
_____	_____
_____	_____
_____	_____
_____	_____

* The amounts of each food, except milk, dark green or deep yellow vegetables, citrus fruit, and other fruits and vegetables, are guidelines. A person knowledgeable in nutrition and in food content can adapt these servings of food so as to obtain the same approximate calories and nutritive value.

NOTES ON FOOD SCOREBOARDS

The minimum goals on the food scoreboards provide approximately for 2.0 grams of protein per kilogram of body weight. This is above the recommended daily dietary allowance of .9 grams of protein per kilogram of body weight which is based on moderate activity. The protein level of the food scoreboard resulted from more commonly used servings of meat. The increased protein does no harm if increased calories are needed. Increased activity and increased muscle mass will also raise the protein requirement.

The servings in the bread group are high. This was by choice since the food pattern of young people includes these foods and the bread group does provide a good source of the extra calories needed by the athlete.

While the total score is the main consideration, it is also important to maintain variety in the foods consumed. To meet the iron needs of the blood some iron-rich foods such as liver, oysters, prune juice, raisins, apricots, and dried beans and peas should be eaten at least once a week.

The recommended foods are limited to the food groups. The calories are approximate and the protein content of the meal plan is higher than recommended. Individuals on unrestricted diets usually eat food mixtures as well as desserts. These extra calories are not included in the food scoreboard, but will be reported by the student. In some cases the recommended foods will be reported in lesser quantity than the minimum goals, but other foods will make up the calories.

Low fat is recommended to reduce total fat in the day's food intake to below 35% of total calories in fat. The low fat milk was used to allow butter or margarine and salad oil to be used to make other foods more palatable.

Recent surveys show increased incident of simple goiter among the population. To prevent simple goiter, iodized salt should be used in cooking and on the table.

SAMPLE MEAL SCHEDULES

To help the teenager establish proper eating habits, at certain caloric levels are presented here. Each sampl required foods in appropriate amounts. Since "how mu important as "what," equal attention has been given to th necessary to meet caloric and other nutrient needs of e study of these examples shows the variety that is possibl set by the calorie total.

The sample meal patterns presented in this handbo a combination of the food groups which will meet the nutrie athletes. They are planned so that in toto the menus needs of young athletes and that a variety of foods within will be used.

A summary of the total servings of foods from the various daily meal schedules of varying calories appears approximate nutrient content of the daily meal schedules i

TWO SAMPLE MEAL SCHEDULES (approximately 2,500 calories)

FOOD LIST CHOICES		FOOD LIST CHOICES	
BREAKFAST		**BREAKFAST**	
Milk	1 cup	Milk	1 cup cocoa
Citrus fruit	½ grapefruit	Citrus fruit	1 cup tomato juice
Bread substitute (1 serving)	½ cup oatmeal	Meat equivalent	1 poached egg
Enriched bread	2 slices toast	Enriched bread	2 slices toast
Butter or margarine	3 tsp.	Butter or margarine	2 tsp.
LUNCH		**LUNCH**	
Milk	1 cup	Milk	1 cup
Meat (2 oz. beef)	Hamburger	Meat equivalent (1 oz.)	Sandwich (2 tbsp.) peanut butter
Enriched bread (2 servings)	1 bun	Enriched bread	2 slices
Vegetables	Carrot sticks	Butter or margarine	1 tsp.
Bread substitute (1 serving)	Potato chips (1 oz. bag)	Vegetable	Vegetable soup
		Bread substitute (1 serving)	5 saltines
		Fruit (1 serving)	Fruit in season
AFTERNOON SNACK		**AFTERNOON SNACK**	
Enriched bread	2 slices	Bread substitute * (1 serving) and fat substitute (2 tsp.)	
Butter or margarine	2 tsp.		
DINNER		**DINNER**	
Milk	1 cup	Milk	
Meat (3 oz.)	Swiss steak	Meat (3 oz.)	
Bread substitute (1 serving)	Baked potato	Bread substitute	
Vegetables	Broccoli Salad	Vegetables	
Dressing (fat substitute)	2 tsp.	Dressing (fat substitute)	
Enriched bread	2 rolls	Enriched bread)	
Butter or margarine	3 tsp.	Butter or margarine	
Fruit (1 serving)	Fruit in season	Bread substitute * (1 serving)	
Bread substitute * (1 serving)	Angelfood cake		
EVENING SNACK		**EVENING SNACK**	
Milk	1 cup	Milk	
Bread substitute * (1 serving)	1 cup popcorn	Bread substitute (3 servings)	

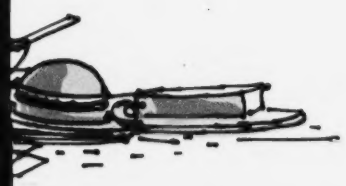
** This is a calorie equivalent but not in nutrient content.*

SAMPLE MEAL SCHEDULES

To help the teenager establish proper eating habits, samples of meals at certain caloric levels are presented here. Each sample includes all the required foods in appropriate amounts. Since "how much" you eat is as important as "what," equal attention has been given to the amount of foods necessary to meet caloric and other nutrient needs of each age group. A study of these examples shows the variety that is possible within the limits set by the calorie total.

The sample meal patterns presented in this handbook are based upon a combination of the food groups which will meet the nutrient needs of young athletes. They are planned so that in toto the menus will meet nutrient needs of young athletes and that a variety of foods within each food group will be used.

A summary of the total servings of foods from the seven groups for various daily meal schedules of varying calories appears on page 18. The approximate nutrient content of the daily meal schedules is also shown.



DULES (approximately 2,500 calories)

FOOD LIST CHOICES					
BREAKFAST					
Milk	1 cup cocoa				
Citrus fruit	1 cup tomato juice				
Meat equivalent	1 poached egg				
Enriched bread	2 slices toast				
Butter or margarine	2 tsp.				
LUNCH					
Milk	1 cup				
Meat equivalent (1 oz.)	Sandwich (2 tbsp.) peanut butter				
Enriched bread	2 slices				
Butter or margarine	1 tsp.				
Vegetable	Vegetable soup				
Bread substitute (1 serving)	5 saltines				
Fruit (1 serving)	Fruit in season				
AFTERNOON SNACK			**AFTERNOON SNACK**		
Enriched bread	2 slices		Bread substitute * (1 serving) and fat substitute (2 tsp.)	½ cup ice cream	
Butter or margarine	2 tsp.				
DINNER			**DINNER**		
Milk	1 cup		Milk	1 cup	
Meat (3 oz.)	Swiss steak		Meat (3 oz.)	Pork chop, lean (no bone)	
Bread substitute (1 serving)	Baked potato		Bread substitute	½ cup noodles	
Vegetables	Broccoli		Vegetables	Peas and carrots	
	Salad			Tossed salad	
Dressing (fat substitute)	2 tsp.		Dressing (fat substitute)	2 tsp.	
Enriched bread	2 rolls		Enriched bread)	2 slices	
Butter or margarine	3 tsp.		Butter or margarine	3 tsp.	
Fruit (1 serving)	Fruit in season		Bread substitute * (1 serving)	Plain cake	
Bread substitute * (1 serving)	Angelfood cake				
EVENING SNACK			**EVENING SNACK**		
Milk	1 cup		Milk	1 cup	
Bread substitute * (1 serving)	1 cup popcorn		Bread substitute (3 servings)	6 graham crackers	

rient content.

TWO SAMPLE MEAL SCHEDULES (approximately 2,700 calories)

FOOD LIST CHOICES	
BREAKFAST	
Milk *	1 cup
Citrus fruit	½ grapefruit
Enriched bread (2 servings)	1 cup oatmeal
Enriched bread (4 servings)	2 sweet rolls
Butter or margarine	3 tsp.
LUNCH	
Meat or equivalents (2 servings)	2 slices cheese
Bread and substitute (3 servings)	1 bun & potato chips (1 oz. bag)
Vegetables	Lettuce and tomato (for sandwich)
	Celery sticks
Milk *	1 cup
AFTERNOON SNACK	
Fruit	Fruit in season
Bread substitute ** (3 servings)	Cup cake
DINNER	
Meat or equivalent (3 servings)	Meat loaf (5 oz.) ***
Bread substitute (2 servings)	Baked potato
Vegetables	Broccoli
	Salad
Dressing (fat substitute)	2 tsp.
Enriched bread (2 servings)	2 rolls
Butter or margarine	4 tsp.
Fruit	Fruit in season
Milk *	1 cup
EVENING SNACK	
Chocolate milk	1 cup
Simple dessert	1 tbsp. chocolate sauce

FOOD LIST CHOICES	
BREAKFAST	
Milk *	1 cup cocoa
Citrus fruit	½ cup orange juice
Meat equivalent	1 poached egg
Enriched bread	3 slices toast
Butter or margarine	3 tsp.
LUNCH	
Meat or equivalent (1 serving)	2 tbsp. peanut butter
Enriched bread	2 slices
Butter or margarine	1 tsp.
Bread substitute (1 serving)	5 crackers
Vegetables	Vegetable soup
Bread substitute (2 servings)	Pound cake (small slice)
Milk *	1 cup
AFTERNOON SNACK	
Bread substitute (2 servings) and fat substitute (2 servings)	1 cup ice cream
DINNER	
Meat (3 oz.)	Pork chop, lean (no bone)
Bread substitute (2 servings)	1 cup noodles
Vegetables	Peas and carrots
	Salad
Dressing (fat substitute)	2 tsp.
Enriched bread	2 slices
Butter or margarine	2 tsp.
Fruit	Fruit in season
Plain dessert	2 cookies
Milk *	1 cup
EVENING SNACK	
Milk *	1 cup milk
Bread equivalent (2 servings)	2 cups popcorn

* *Milk — Low fat (2% butter fat)*
** *A calorie equivalent but not in nutrient content.*
*** *Meat loaf has bread crumbs and some filler, so extra weight is allowed.*

TWO SAMPLE MEAL SCHEDULES (ap

FOOD LIST CHOICES	
BREAKFAST	
Citrus fruit	½ grapefruit
Bread substitute (2 servings)	1 cup oatmeal
Enriched bread	2 slices toast
Butter or margarine	2 tsp.
Jelly or sugar	1 tbsp.
Milk *	1 cup
LUNCH	
Meat equivalents (4)	Cheeseburger
	3 oz. beef
	1 slice cheese
Bread substitutes (4 servings)	1 bun & potato chips (2 oz. bag)
Vegetables	Onion (for cheeseburger)
	Carrot sticks
Plain dessert	Cookie (3")
Milk *	1 cup
AFTERNOON SNACK	
Fruit	Fruits in season
Bread substitute (2 servings)	2 cups popcorn
DINNER	
Meat (3 oz.)	Meat loaf (5oz.) **
Bread substitute (2 servings)	Baked potato
	Broccoli
	Salad
Dressing	2 tsp.
Enriched bread	2 rolls
Butter or margarine	4 tsp.
Fruit	Fruit in season
Milk *	1 cup
Bread substitute (2 servings)	Plain cake
EVENING SNACK	
Milk *	1 cup
Bread substitute (1 serving and fat substitute) (1 serving)	½ cup ice cream
Plain dessert	1 tbsp. sauce

* *Milk — Low fat (2% butter fat)*
** *Meat loaf has bread crumbs and some filler, so extra weig*

EDULES (approximately 2,700 calories)

FOOD LIST CHOICES	
BREAKFAST	
Milk *	1 cup cocoa
Citrus fruit	½ cup orange juice
Meat equivalent	1 poached egg
Enriched bread	3 slices toast
Butter or margarine	3 tsp.
LUNCH	
Meat or equivalent (1 serving)	2 tbsp. peanut butter
Enriched bread	2 slices
Butter or margarine	1 tsp.
Bread substitute (1 serving)	5 crackers
Vegetables	Vegetable soup
Bread substitute (2 servings)	Pound cake (small slice)
Milk *	1 cup
AFTERNOON SNACK	
Bread substitute (2 servings) and fat substitute (2 servings)	1 cup ice cream
DINNER	
Meat (3 oz.)	Pork chop, lean (no bone)
Bread substitute (2 servings)	1 cup noodles
Vegetables	Peas and carrots Salad
Dressing (fat substitute)	2 tsp.
Enriched bread	2 slices
Butter or margarine	2 tsp.
Fruit	Fruit in season
Plain dessert	2 cookies
Milk*	1 cup
EVENING SNACK	
Milk*	1 cup milk
Bread equivalent (2 servings)	2 cups popcorn

t content.
filler, so extra weight is allowed.

TWO SAMPLE MEAL SCHEDULES (approximately 3,000 calories)

FOOD LIST CHOICES		FOOD LIST CHOICES	
BREAKFAST		**BREAKFAST**	
Citrus fruit	½ grapefruit	Citrus fruit	1 cup tomato juice
Bread substitute (2 servings)	1 cup oatmeal	Meat equivalent	1 poached egg
		Enriched bread	3 slices toast
Enriched bread	2 slices toast	Butter or margarine	2 tsp.
Butter or margarine	2 tsp.	Milk*	1 cup cocoa
Jelly or sugar	1 tbsp.		
Milk*	1 cup		
LUNCH		**LUNCH**	
Meat equivalents (4)	Cheeseburger 3 oz. beef 1 slice cheese	Meat equivalents (2)	1 slice cheese 2 tbsp. peanut butter
Bread substitutes (4 servings)	1 bun & potato chips(2 oz. bag)	Enriched bread	3 slices
		Butter or margarine	2 tsp.
Vegetables	Onion (for cheeseburger) Carrot sticks	Bread substitute (1 serving)	5 crackers
		Vegetables	Vegetable soup
Plain dessert	Cookie (3")	Plain dessert (2 servings)	Cupcake
Milk*	1 cup		
AFTERNOON SNACK		**AFTERNOON SNACK**	
Fruit	Fruits in season	Bread substitute (3 servings)	Pizza
Bread substitute (2 servings)	2 cups popcorn		
DINNER		**DINNER**	
Meat (3 oz.)	Meat loaf (5oz.)**	Meat (4 oz.)	2 pork chops, lean (no bone)
Bread substitute (2 servings)	Baked potato	Bread substitute (2 servings)	1 cup noodles
	Broccoli	Vegetables	Peas and carrots
	Salad		Salad
Dressing	2 tsp.	Dressing (fat substitute)	2 tsp.
Enriched bread	2 rolls	Butter or margarine	2 tsp.
Butter or margarine	4 tsp.	Enriched bread	2 slices
Fruit	Fruit in season	Fruit	Apricot halves
Milk*	1 cup	Bread substitute (2 servings)	2 cookies (3")
Bread substitute (2 servings)	Plain cake		
EVENING SNACK		**EVENING SNACK**	
Milk*	1 cup	Milk*	1 cup
Bread substitute (1 serving and fat substitute) (1 serving)	½ cup ice cream	Bread substitute (2 servings)	2 cups popcorn
Plain dessert	1 tbsp. sauce		

** Milk — Low fat (2% butter fat)*
*** Meat loaf has bread crumbs and some filler, so extra weight is allowed.*

TOTAL SERVINGS OF FOODS IN DAILY MEAL SCHEDULES

Approximate Calories	Whole Milk**	Meat or Equivalent	Dark Green or Deep Yellow Vegetables	Citrus Fruit or Substitute	Other Fruits and Vegetables	Enriched or Whole Grain Bread or Substitute	Butter, Margarine, Oil, or Fat	Extra Calories* Food equivalent or Sugar, Jelly, or Plain Dessert
2250	4 cups	5 ounces	1 serving	1 serving	2 servings	10 servings	7 teaspoons	1 small serving
2500	4 cups	5 ounces	1 serving	1 serving	2 servings	13 servings	10 teaspoons	—
2700	4 cups***	5 ounces	1 serving	1 serving	3 servings	16 servings	10 teaspoons	1 small serving
3000	4 cups***	7 ounces	1 serving	1 serving	3 servings	18 servings	10 teaspoons	2 small servings
3500	6 cups***	11 ounces	1 serving	2 servings	3 servings	19 servings	8 teaspoons	2 servings

APPROXIMATE NUTRIENT CONTENT OF DAILY MEAL SCHEDULE

	CARBOHYDRATE		PROTEIN		FAT	
Approximate Calories	Grams	% Total Calories	Grams	% Total Calories	Grams	% Total Calories
2250	250	44	90	16	100	40
2500	270	43	97	16	115	41
2700	335	48	107	17	105	35
3000	380	51	130	18	105	31
3500	425	49	170	19	125	32

** These calories are expressed in these foods since it is recognized the usual family food pattern may include desserts, gelatin salads, sweetened fruit, snacks, carbonated beverages, and the like. For equivalents in carbohydrates see foods listed on page 15.*

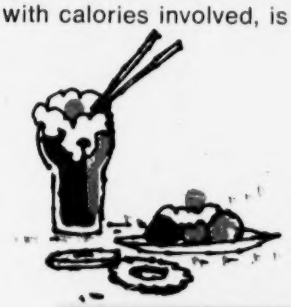
*** If 1 cup of skim milk is used in place of 1 cup of whole milk, 2 teaspoons of additional fat may be used.*

**** Low fat milk (2% butterfat).*

SNACKS

The calories consumed by eating between meals are sometimes overlooked in the daily totals. Snacking should be counted in determining the total scores for the one-day meal record and the food scoreboard. Eating between meals is not necessarily bad if extra calories are needed to achieve

daily calorie totals. In addition to providing energy, some snacks provide calcium, protein, vitamins, and minerals which may be needed. A snack list, with calories involved, is shown below.



SNACK AND DESSERT LIST*

	Approximate Calories
Milk shake (fountain size)	400
Malted milk shake (fountain size)	500
Sundaes	215-325
Sodas	260
Hamburger (including bun)	360
Hot dog (including bun)	210
Pizza (4"- 5" section)	135
Popcorn, lightly buttered (½ cup)	75
Nuts (3 tbsp. chopped, or 30 peanuts)	150
Pound cake (⅜" slice)	140
Cup cake with frosting (2¾" diam.)	185
Layer cake with frosting (2" slice)	370-445
Pancake (4" diam.)	60
Waffle (medium, 4½" x 5½" x ½")	215
Add 20 calories for each teaspoon syrup or sweetening	
Add 45 calories for each teaspoon butter or other fat spread	
Brownies (2" x 2" x ¾")	140
Plain cookie (3" diam.)	120
Pie (⅛ of a 9" pie)	275-345
Fruit juice (1 cup)	110-165

*One slice of bread is approximately 70 calories. When these foods are used in place of bread they will not have the same nutritive value.

TEENAGE PROBLEMS RELATING TO FOOD

Many teenagers have habits and time commitments which interfere with their eating patterns. Busy families, fewer meals at home, group pressures, and irregular hours are just a few of such influences. Poor eating habits may affect the potential of anyone aiming at sports competition. A few problems that contribute to the adequacy or inadequacy of teenage diets are considered here briefly.

Skipping Breakfast

"I don't have time . . ." "It's too much bother . . ." "I don't like . . ."

A prospective athlete using excuses such as these doesn't really know the score! Studies show that fatigue and laxness "hit" one late in the morning if breakfast is omitted. To be mentally and physically alert, one needs about one-third of the day's food for breakfast. The traditional breakfast means a citrus fruit or juice (or a substitute in terms of vitamin C), cereal and/or toast, and a milk drink.

Meal Schedules

Better nutrition can be expected from eating regular meals daily, each meal providing a variety of foods. Meal hours need not be rigid. They can be changed to meet family circumstances and student schedules, but nutrient requirements must be met. Each day the daily food lineup should be followed. This is the first step in preparing for training and for sports competition.

Snacking

"No snacks" is often the rule given young athletes. But wait a minute — if properly chosen, they can be an asset. Since snacks are a teenage ritual, they can be used to advantage in the routine of nutritional conditioning. The questions to ask are these:

Are extra calories needed?

Does this snack count for more than calories?

How important is it as a source of such dietary nutrients as protein, minerals, and vitamins?

Fruit, for instance, provides minerals and vitamins. Hamburgers and pizza can meet part of the protein requirement, as can nuts. Milk shakes can partly substitute for milk — but watch for the extra calories where weight is a problem.

Here are some of the snacks that *cannot* be substitutes for the milk, fruits, vegetables, meat, bread, and cereals in daily meals:

Carbonated beverages and soft drinks
Coffee and tea
Sugars and candy

This does not mean that such foods need to be eliminated entirely. They should be added, however, only after nutrient requirements have been met, and when body weight permits extra sources of energy. (See page 19 for snack foods with their energy values.)

Exercise

For many young people the most strenuous activity during the day is walking to and from classes. Yet, most of them rate themselves as being at least average in activity — confusing real physical activity with a minimum of body movement.

The problem is more apparent in overweight teenagers and young adults. Recent findings point to the fact that although they are aware of their inactivity, they have no conception of the degree to which it is a problem. Even during scheduled exercise periods, they expend less energy than do nonobese teenagers. In some cases, overweight young people do not have abnormally high food intakes; therefore, lack of exercise appears to be one key to their condition.

Coaches and physical education instructors are in a unique position to contribute to the solution of this problem of inactivity. Not only can greater participation in sports activities be encouraged, but special classes

(a combination of physical education and nutrition education) can be organized to help overweight teenagers. Parents, too, can encourage the types of activities that, together with diet and other physical fitness factors, will prepare young people for athletic performance.

The young athlete and his parents can cooperate better when they have an understanding of why certain food restrictions may be needed. A coach can send parents information regarding the individual needs of their teenager. An explanation concerning the need to maintain or lose weight can be given with a guidebook, such as the following:

The Healthy Way To Weigh Less (American Medical Association, 535 N. Dearborn St., Chicago, Ill. 60610, 1966)

Step Lively and Control Weight (The American Dietetic Association, 620 North Michigan Ave., Chicago, Ill. 60611. To be revised Feb. 1971)

A Girl and Her Figure, by Ruth M. Leverton (National Dairy Council, 111 North Canal St., Chicago, Ill. 60606. Revised 1970)

A Boy and His Physique, by Walter H. Gregg (National Dairy Council, 111 North Canal St., Chicago, Ill. 60606. Revised 1970)

United States Government Diet Book: Food and Your Weight (Superintendent of Documents, U.S. Govt. Printing Office, Washington, D.C. 20402)

Obesity, by George Christakis, M.D. and Robert K. Plumb (The Nutrition Foundation, Inc., 99 Park Ave., New York, N.Y. 10018)

Nutrition and Physical Fitness, by Bogert, Briggs and Calloway, 8th ed. (W. B. Saunders Company, Philadelphia, 1966)

A FINAL WORD ON NUTRITIONAL CONDITIONING

The athlete should be encouraged to watch his food intake during the entire year, not just at the competitive season. This way he can maintain his body weight and a good state of nutrition the year around without a "crash" plan to get into top form.

Good food habits should be learned and practiced early and continued throughout one's life. The earlier one understands what constitutes a good meal, the better, for poor eating habits are hard to overcome. The coach can be a major factor in maintaining good nutrition throughout life if the young athlete, under his motivating influence, understands and accepts good eating habits.

SECTION II NUTRITION AND ATHLETIC PERFO

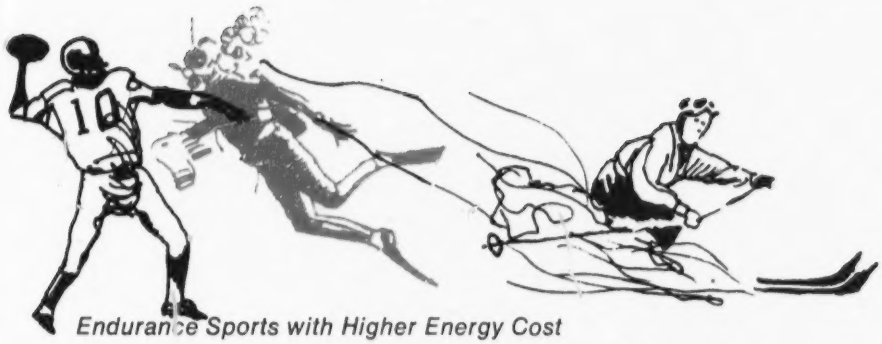
UTRITION AND ATHLETIC PERFORMANCE

The first nutritional requirement for athletic performance is energy, which may be called "caloric cost." The harder and the longer muscular work is carried on, the more energy is used. If a sport involves endurance or extreme stress, energy metabolism becomes complicated. This process is intimately related to the specificity of the training program in which the athlete is participating. However, it is at this point that questions arise about which foods are the most efficient sources of energy. Since energy is so important, it seems logical to consider sports from this standpoint first. (See list on page 26.)

SPORTS WITH COMPARATIVELY LOW ENERGY COST

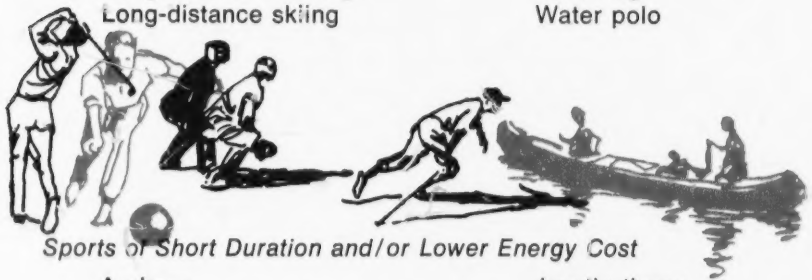
Many sports are "single efforts," such as field events, diving, and ski jumping. Others are of short duration, such as short-distance swimming and skiing, sprints, and hurdle races. Although they require strength and ability to react quickly, energy needs are increased relatively little if these sports are practiced less than an hour a day.

There are other sports that make comparatively small demands on muscles, thus calling for less energy. Typical of this category are such activities as archery, golf, and equestrian sports. Here again, comparatively little extra energy is demanded if practice time is less than an hour a day.



Endurance Sports with Higher Energy Cost

Football
Gymnastics (especially apparatus)
Handball
Hockey (ice and field)
Long-distance canoeing
Long-distance rowing
Long-distance running
Long-distance skating
Long-distance skiing
Long-distance swimming
Marathon
Middle-distance running
Mountaineering
Pentathlon
Skin diving
Soccer
Tumbling
Water polo



Sports of Short Duration and/or Lower Energy Cost

Archery
Baseball
Basketball
Boating (sailing and ice boating)
Bowling
Boxing
Canoeing, slow or moderate speed
Cycling, slow or moderate speed
Dancing
Diving
Equestrian sports
Fencing
Golf
Gymnastics
High jump
Hurdle races
Javelin throw
Judo
Pole vaulting
Rowing, slow or moderate speed
Shooting
Short-distance running
Short-distance skiing, slalom
Short-distance swimming
Shot put
Skating
Ski jumping
Softball
Sprints
Tennis
Volleyball
Weight lifting
Wrestling

Approximate Energy Cost of Various Exercises and Sports

Sport or Exercise	***Total Calories Expended per Minute of Activity***
Climbing	**10.7-13.2**
Cycling 5.5 mph	**4.5**
9.4 mph	**7.0**
13.1 mph	**11.1**
Dancing	**3.3-7.7**
Football	**8.9**
Golf	**5.0**
Gymnastics	
Balancing	**2.5**
Abdominal exercises	**3.0**
Trunk bending	**3.5**
Arms swinging, hopping	**6.5**
Rowing 51 str./min.	**4.1**
87 str./min.	**7.0**
97 str./min.	**11.2**
Running	
Short-distance	**13.3-16.6**
Cross-country	**10.6**
Tennis	**7.1**
Skating (fast)	**11.5**
Skiing, moderate speed	**10.8-15.9**
Uphill, maximum speed	**18.6**
Squash	**10.2**
Swimming	
Breaststroke	**11.0**
Backstroke	**11.5**
Crawl (55 yd./min.)	**14.0**
Wrestling	**4.2**

SPORTS WITH HIGH ENERGY COST

Sports requiring extra energy expenditure over a long period include such efforts as middle- and long-distance running, swimming, and skin diving. The preseason conditioning and hours of training required for sports such as swimming, track, and football may increase the total caloric needs to as high as 4,000 to 5,000 calories a day, depending on body size and weight.

Almost any sport with relatively low energy cost can be placed in the high energy classification if it is carried on intensively for a long time (for instance, the prolonged golf game or tennis match, or the extensive practice put in by the champion athlete).

Here is one way to estimate roughly the increased energy requirements for endurance sports, prolonged practice periods, or preseason conditioning:

1. Estimate everyday energy requirements (see page 9).
2. Tabulate the amount of time and the calories spent in extra activities by referring to chart (page 26).
3. Add these figures to arrive at total energy needs in terms of calories.
4. Subtract 75 calories per hour for length of activity.

AVAILABILITY OF ENERGY

In many athletic events of short duration or of lower energy cost, the source of food energy is of minor concern. Energy supplied by eating adequate amounts of everyday foods will provide the necessary fuel.

Body reserves of energy are mainly in the form of glycogen (carbohydrate which is released as glucose). Carbohydrate is stored as follows:

Liver glycogen	**110 grams**
Muscle glycogen	**250 grams**
Glucose in body fluid	**15 grams**
Total	**375 grams**

The maximum caloric value, *if* these carbohydrate stores could be used completely, is about 1,500 calories.

MISCONCEPTION: Honey, glucose, or other "quick energy" foods eaten before events of short duration enhance performance.

FACT: *The extra energy needed for short-term performance is already available within the body. Sweets eaten just before short-term events will not necessarily improve performance but will be used by the body to help replace the energy used during performance. (See suggestions for quick energy supplements, page 46.)*

Training and conditioning are known to improve both the ability to perform and the ability to use body energy stores as well. Exhaustion, with symptoms such as cold chills, disturbances in vision, and severe muscular fatigue, occurs in two hours or less in untrained individuals exercising strenuously. Untrained persons in athletic ventures have been shown to use only a little more than half of their body carbohydrate stores. Trained athletes, on the other hand, do not become completely exhausted, are able to exercise longer, and, according to some research, use almost all their body carbohydrate reserves.

MISCONCEPTION: Protein is a primary source of muscular energy.

FACT: *In a well nourished person, protein is* not *a major source of energy. Protein needs are governed by growth and the increased muscle mass developed through training.*

FOOD ENERGY RELATED TO PERFORMANCE

There is still much to be learned about how food energy is related to performance. However, certain broad guidelines have been developed.

HIGH CARBOHYDRATE DIET

There is a slight increase in muscular efficiency after a high carbohydrate diet has been eaten. Endurance capacity — the ability to carry on

a sports activity longer — is enhanced if body stores of carbohydrate are filled before the exercise period. It has been suggested that for long and hard training or conditioning, 50% or more of food calories should come from carbohydrate sources; the usual is about 40%.

MISCONCEPTION: No candy, sweets, pastries, or cakes should be eaten during training; bread and potatoes should be restricted.

FACT: *In sports where extra energy is needed, it is necessary to eat* some *foods of high starch and sugar content to help keep body carbohydrate reserves filled. (All foods listed above are primarily carbohydrate, except pastry.) It would be hard to meet a requirement of over 3,000 calories a day without extra sugars and starches, particularly if the amount of fat were limited. When energy requirements are high, additional foods other than those listed in the Daily Food Line-Up (page 8) may be used. The extent to which "extras" and substitutions can be fitted into the meal plan is clearly shown in the menu schedules for the various caloric levels on pages 13-14.*

MODERATE TO LOW FAT DIET

The average American eats a diet of which about 40 percent of the calories are derived from fat. When caloric intake is higher than normal, the percentage of calories from fat is probably still higher. If meat servings are generous and whole milk is used the diet will contain more than 40 percent fat. The trend is toward restricting fat in the diet as a preventive measure against obesity and coronary heart disease.

MISCONCEPTION: No fats, no fried foods, no oily dressing should be eaten.

FACT: *The human body needs a certain amount of fat. Fats in the diet are carriers of the fat-soluble vitamins E, K, D, and A. Fat also provides a concentrated form of calories. Furthermore, fat makes a meal more satisfying. Food is tastier and a person does not feel hungry as quickly if meals contain some fat. On entering the intestinal tract, fat causes the*

release of a hormone, enterogastrone, which slows down the emptying time of the stomach. (A circumstance where the "faster than usual" emptying time of the stomach may be an important factor is the pre-event meal, when fat should be limited.) Whether the fat is butter or margarine, the natural fat content of food, the oil in salad dressings, or the fat used for frying, almost all are completely digested at about the same rate. Foods fried in fat which has not been burned or which does not contain other contaminants are well tolerated by the normal young person. Therefore, moderate amounts of foods properly fried are not taboo.

PROTEIN NEEDS

Increasing muscle mass is associated with training and conditioning. Like all growth processes, an adequate supply of good quality protein is required. For the preteen-ager and teen-ager — nonathlete and athlete alike — the recommended protein intake is 11-16% of total calories (about 1 gram of protein per kilogram of body weight). This covers usual growth demands.

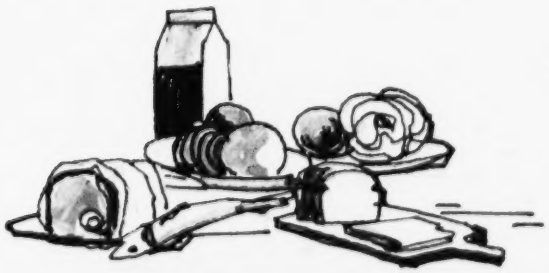
The table entitled "Protein Content in Minimum Daily Line-Up" indicates the amount of protein contributed by each food group. The total amount of protein exceeds the Recommended Daily Allowance and should be adequate for maintenance, growth, and muscle building.

MISCONCEPTION: Protein and amino acid supplements are needed for muscle building.

FACT: *The quality of protein provided by such foods as meat, fish, poultry, milk, cheese, and eggs is the best source of tissue-building material. Adverse nutritional effects have been reported in animals when the diet is supplemented with a single amino acid, an unbalanced mixture of amino acids, or a protein of poor nutritional quality. Such supplementation in man is expensive and at best probably useless.*

MISCONCEPTION: Steak is the best source of protein for athletes.

FACT: *Steak is a good source of protein and so are fish and poultry. Pork and lamb are just as good sources of protein as beef and may be included in the weekly menus.* Any *meat or meat equivalent that a person enjoys, such as meat balls, pork, fish, lamb, chicken, hamburger, cheese, and eggs, is a good source of quality protein.*



PROTEIN CONTENT IN MINIMUM DAILY FOOD LINE-UP
(2500 calories)

Food Groups	Total Servings Per Day	Protein Content in Grams
Milk	4 cups	32
Meat, fish, poultry, eggs, or equivalent	5 ounces	35
Dark green or deep yellow vegetables	1 serving	2
Citrus fruits	1 serving	
Other fruits and vegetables	2 servings	1
Enriched bread, cereal, potatoes, or substitute	10 servings	20
Butter, margarine, or other fats	7 teaspoons	0
	Total	90 grams

MISCONCEPTION: Next to meat, eggs are the most important source of protein; two to four a day should be eaten — raw or poached, never fried or hard-cooked.

FACT: *No one good quality protein need be emphasized over another. A properly cooked egg in any form is digested well. However, a real danger exists in consumption of raw eggs because of a chance of bacterial contamination with salmonella, which causes food poisoning. Nutritionally, raw eggs are less desirable because they contain avidin (neutralized in cooking) which destroys biotin. Because of current research on coronary heart disease indicating the relationship to elevated serum cholesterol, no more than three eggs a week are advised.*

BEVERAGES

MILK

Milk is one of the most nearly "perfect" foods. If it is omitted for a period of time, the nutrients calcium, phosphorus, and riboflavin are apt to be inadequate. It is an excellent source of protein. There is no scientific basis for eliminating milk from the athlete's diet.

MISCONCEPTION: Milk causes "cotton mouth" (dryness and discomfort in the mouth due to decrease in activity of salivary glands).

FACT: *Studies show that saliva flow and the condition of the saliva are related to the amount of perspiration and any reduction in water content of the body and are not affected by the kind of food eaten before the athletic event. Saliva flow may also be influenced by one's emotional state.*

MISCONCEPTION: Milk "curdles" in the stomach, causing sour stomach and interfering with performance.

FACT: *When milk is mixed with stomach acids, the curdling that results is a necessary process of digestion and does not cause stomach upset. Milk may buffer excess acid in the stomach (neutralizer of acid).*

MISCONCEPTION: Milk decreases speed of movement and "cuts wind."

FACT: *Studies have been made which show no difference in training response or in all-out performance when milk is either included or excluded from the diet.*

It is easier to plan an adequate diet if milk in some form is included. It is a good source of high quality protein and phosphorus, and it ensures that calcium and riboflavin needs are met. Milk products also are among the best snacking foods when extra energy is needed. This includes milkshakes, other milk drinks, and cheese.

TEA AND COFFEE

Tea is a popular beverage with some coaches and is often thought to be preferable to coffee. Yet they both contain caffeine, a temporary stimulant. A cup of strong coffee has about 0.1 to 0.15 grams caffeine. A cup of strong tea contains about 0.1 grams of caffeine. Tea and coffee should be used in moderation. Taken in excess, they act only as temporary stimulants and do not alleviate fatigue for any length of time.

CARBONATED AND OTHER SWEETENED BEVERAGES

These beverages mainly contribute calories and fluids. The cola drinks have caffeine in varying amounts and are considered stimulants, along with tea and coffee. If used as snacks and not to replace other liquid foods, particularly milk, carbonated beverages may be used in moderation.

ALCOHOLIC DRINKS

Alcohol is a depressant of the central nervous system, and even small quantities affect the finer movements of the body's coordination. Larger amounts affect coordination more grossly.

WATER NEEDS

Almost every operation or motion of the body requires water. The digestion and proper utilization of foods cannot be accomplished without water.

Nutrients are carried to the tissues and waste products are carried away by water. Water is also necessary in the control of body temperature through perspiration. It is even more necessary than food.

To prepare for sweat losses, particularly in hot weather, the pre-event meal should include enough liquid. Usually 1 to 3 cups of water or beverage will ensure adequate hydration.

MISCONCEPTION: Eat first, drink later.

FACT: *Whether the liquid is water or another beverage, it is not harmful to drink during meals. It is a bad habit, however, to use excessive amounts of a beverage to wash food down without chewing it. Even then, digestive juices are usually sufficiently powerful to handle most large gulps of food. Of course, drinking a large volume of liquid at one time could discourage eating or give an uncomfortable feeling of fullness. Common sense should be used. Iced beverages should be drunk more slowly because if taken in excess, normal peristalsis may be interrupted.*

SWEATING AND WEIGHT LOSS

Preseason conditioning and practice often come in warm weather — spring training for track or baseball, late summer practice for football. During the first week or two, the problems of heat stress are likely to occur; it takes that long for the body to adjust to hard training in hot weather. Fatigue develops, pulse rate and body temperature rise, mechanical efficiency decreases, and there is weight loss, due mostly to sweating, not to loss of body fat. Losses of about 10 pounds per session for high school and college students are considered excessive and dangerous, representing a degree of dehydration incompatible with health. Excessive losses of water due to sweating lead to fatigue, lower efficiency, and an increase in accidents.

MISCONCEPTION: Drink no water during practice. Suck on ice cubes only. Rinse out mouth only.

FACT: *Drinking some water combats the undesirable effects of dehydration and improves endurance. The best performance of fully acclimatized, nutritionally conditioned athletes is achieved by replacing* ***hour by hour*** *the water lost in sweat.*

Team physicians for college varsity football teams have recommended that during preseason practice in hot weather, all players be weighed in and out. (A team trainer or student manager can be assigned to this task.) A loss of two pounds of weight represents a loss of one quart of sweat. Weight loss thus becomes the guide for water replacement. Water allowance is determined by the capacity or tolerance of the individual. Here is a guide to water replacement.

Loss of Weight Pounds	Extra Water Intake Cups
2	4
4	8
6	12

Experience shows that an individual seldom voluntarily drinks as much water as he loses in sweat. He usually drinks at a rate of about two-thirds of the water lost in sweat; the difference may be made up following the day's practice. Athletes, particularly those who tend to lose more than five pounds during a practice session, should be encouraged to drink more water while on the practice field. Frequent drinks must be emphasized.

SALT SUPPLEMENTATION

Extra salt is needed when heavy exercise and hot weather cause excessive sweating, as in the period of a week or so when adapting to sudden heat (preseason conditioning) and when heat is extreme.

For most athletes, salting of food at each meal will take care of sodium requirements. When sweating is profuse, extra salt may be required. The facts below will help interpret sodium depletion:

	Sodium Content in Grams
Untrained person's sweat, per quart	0.5-1.8
Trained and acclimatized athlete's sweat, per quart	0.7-1.1
Average meal, well salted	3.0-4.0
1 cup bouillon (1 bouillon cube)	1.0
1 cup beef or chicken broth; consommé	.8
½ teaspoon salt	1.0

In most individuals, a weight loss of 2 pounds for each quart of sweat means a sodium depletion of 1-2 grams. Bouillon and broth are liquids that take care of both sodium depletion and dehydration and are often better tolerated than salt tablets.

SWEAT BATHS AND WATER RESTRICTION

"Making weight" (i.e., reducing) is practiced in such sports as wrestling, boxing, and football. Sweating and diminishing water intake are two of the common procedures used. Some wrestlers will go to great lengths to achieve their weight goal. The dangers of excessive water loss in the body are discussed on page 34. Loss of body water in excess is dangerous to the very life of the individual.

"Making weight" is sometimes accomplished by crash diets. However, the immediate physiological effects of dehydration by sweat bath or other means seem to be much more drastic than those of semi-starvation. Studies show that weight losses up to 5% of body weight, accomplished in less than 24 hours, are apt to decrease ability to perform and cause stress on the cardiovascular system. These effects do not occur when weight is lost gradually by properly planned diets. Wrestlers at one university proved this by losing weight (no more than 10% of body weight) over a period of several weeks. Heart rate did not increase, and they were able to complete an established maximal work load.

DESIRABLE BODY WEIGHT

CRASH DIETS

A major problem in high school athletics, according to the National Federation of State High School Athletic Associations, is the *indiscriminate* and *extreme* practice of keeping a boy's weight unduly low during an important period of growth and development in order to make a lower weight division.

Certain athletic groups, such as the Bantam Football League, set weight limits. Junior high school boys, big for their age, cannot make the team unless they "diet." There is also the wrestler who must "make weight" for his next bout. These boys may use dangerous means to reduce to below normal weight.

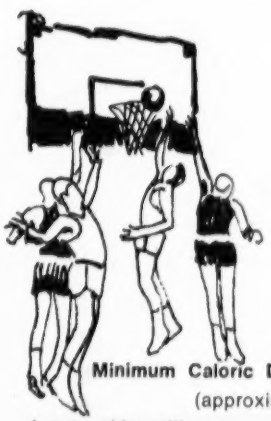
MISCONCEPTION: The crash diet is an effective way to reduce.

FACT: *A very biased diet may cause weight reduction, but it also takes away the protective foods and energy that help maintain good health and performance. An added danger is the temptation to* continue *to use such a diet over a period of time, with the possibility of harmful metabolic effects.*

If there seems to be a need for weight reduction, check with a physician before recommending a diet. If he agrees, check with him or the dietitian in the school or university about the appropriateness of this minimum diet.

"FAT PADDING"

Preseason conditioning often requires more energy than the competitive season. Football players with double practice sessions, for instance, may use about 500 calories a day more than during the regular season. In contact sports, fat deposits around the kidneys and other organs are important to help prevent injury, so it is necessary to keep weight up. For good sources of extra calories to maintain energy and proper weight, check the snack list on page 19.



Minimum Caloric Diet for Early Teenage Athlete

(approximately 1300 calories)

4 cups skim milk
3 servings (a total of 5 ounces) lean meat, fish, poultry, or cheese
1 serving dark green or deep yellow vegetables
1 serving citrus fruit
2 servings other fruits and vegetables
5 servings enriched bread, potatoes, cereal, or substitutes
3 teaspoons butter, margarine, oil, mayonnaise, or other fats

SECTION III EATING AND ATHLETIC EVENTS

PRE-EVENT EATING

How much should an athlete eat before a game? When should he eat his last meal before competition? What kinds of food are best suited for this meal? Pre-event nutrition is a subject of importance to young athletes, who know the "butterflies in the stomach" feeling.

Coaches are concerned that the athlete be able to exert himself close to his full potential without any of the discomforts which may arise from eating. Abdominal cramps and weakness, belching, bowel disorders, "gas pressure" or a "lump" in the stomach, nausea, vomiting, or any other gastrointestinal discomfort can be expected to impair the athlete's performance. Emotional stress and nervous tension may be some of the underlying causes of these symptoms. In spite of this, there are certain dietary precautions which can be taken to alleviate some of these problems. Preventive measures are based on an understanding of nutrient needs and a knowledge of how food is handled in the body. Pre-event food and meals are thus very important aspects of the nutrition of the athlete. The essential point is that nutrition should not interfere with competitive performance, with its physical and psychological stresses.

Evidence indicates that the relative composition or size of the meal preceding an athletic event of short duration has little influence on improving performance. A main concern is that the meal be consumed a reasonable time before the competitive event. The delay between eating and performance depends upon how long it taks to complete digestion and absorption of the particular food.

Unfounded beliefs have probably placed greater restrictions than necessary on food choices for the pre-event meal. The rigidity of some well known recommendations is obviously extreme and limited in the light of what is known about food and its digestion. There is no reason why an athlete should not enjoy his pre-event meal and have the privilege of select-

ing (within certain prescribed bounds) the customary food he enjoys at other times during training.

FOODS TO BE AVOIDED

Fat. In everyday nutrition, some fat in the meals is desirable. Fat should be kept to a minimum in the pre-event meal, since fat in any form slows emptying time of the stomach. The athlete will want to have digestion in the stomach completed before the competitive event begins; thus, fat should be restricted in the pre-event meal.

Gas formers. There can be no hard and fast rule to classify foods as "gas formers." A food that is alleged to cause gas in one person can be eaten by another with no ill effects. Some foods that have a reputation for causing excessive belching and flatus are dried beans, cabbage, onions, radishes, cauliflower, and turnips. The elimination of these few foods in the meal before competition does no harm and may result in increased comfort for some.

Excessive swallowing of air in eating, drinking, or breathing may also be a factor in causing the discomfort of gas.

Proteins and bulky foods. It is important to avoid urinary and bowel excretion during a competitive event. Because proteins are a source of fixed acids which can only be eliminated by urinary excretion, protein intake is best reduced to a minimum at the meal preceding the event.

Indigestible residue from food increases fecal bulk, and so bulk foods — high cellulose or fiber foods — are best reduced in the pre-event meal. This is particularly true in prolonged or intermittent sports events.

MISCONCEPTION: Stay away from "irritating" foods such as spices and "bulky" foods such as lettuce and bran; eat "bland and nonirritating foods."

FACT: *Ideas about which foods are "bland" and which foods are "irritating" are usually based on unverified impressions and traditional lore. The few reliable studies that exist fail to substantiate various popular beliefs con-*

cerning the effects of food on digestion. Most discomfort or difficulties caused by various foods most likely exist only on an individual basis. Modification of the foods eaten should be based on the previous experiences which an individual student may have had.

While white and black pepper, chili pepper, cloves, and mustard seed may be considered "irritating," there seems to be no reason for limiting the use of other spices, such as paprika, cinnamon, allspice, mace, thyme, and sage.

Lettuce, often considered the symbol of vegetables containing roughage, actually contains only 1.6 to 4.5 percent of indigestible fiber. Lettuce and other vegetables and fruits of even higher roughage (fiber) content do not upset the process of digestion; it is their contribution to fecal bulk which can be of concern.

MEAL TIMING

The pre-event meal should be eaten about three hours before competition. This period of time allows for digestion and absorption and is not too long to allow feelings of hunger to develop. Under ordinary circumstances, it takes the stomach from three to four and a half hours to empty after a regular meal, although pre-game emotional strain may lengthen this period.

Some research has been done on the effects of timing pre-event meals for athletes. For example, one study dealt with the effect of eating at various times on free-style swimming performance. A small meal of cereal, milk, bread, and butter had no adverse effects, whether the athletes ate the meal one-half hour or three and a half hours before competition. None of the participants suffered cramps, nausea, or vomiting. It should be noted, however, that this was a meal of only about 500 calories.

LIQUID MEALS

Some athletes who have experienced nausea or stomach cramps before games after having had a regular meal have found that the liquid equiva-

lent is more satisfactory. Research studies have been made about the use of liquid meals in training programs. For example, observations of one team of football players using a liquid meal showed that there was no difference between the liquid and the conventional meal with respect to subsequent hunger, diarrhea, or weight changes. Dryness of mouth was less frequent and both vomiting and muscular cramps were eliminated.

A commercial liquid formula (12½ oz. can) usually contains about 400 calories. It is important to read the labels of these commercially available liquid formulas to see exactly what nutrients they contain.

One formula for a quart of "homemade" liquid diet is as follows:

Nonfat dry milk	**½ cup**
Skim milk	**3 cups**
Water	**½ cup**
Sugar	**¼ cup**
Flavoring, vanilla	**1 teaspoon**

(1 cup will provide 200 calories)

Sometimes the formula is used alone, or it may be used to replace some of the solid foods in the pregame meal. Two cups of the liquid formula leaves the stomach in about two hours, which is more rapid than a regular meal and one of the reasons why it is helpful in some cases.

There is no doubt about the convenience of the liquid meal. However, indiscriminate use has both financial and educational disadvantages. Its use should be regarded as a temporary expedient only, particularly for the high school student, for it deprives the young athlete from eating a variety of foods which is important to his physical fitness in the future. Furthermore, it should be noted that the liquid formulas which include only glucose, amino acids, peptides, or dextrins (predigested foods or foods broken down into smaller molecules) are more likely to cause discomfort. For this reason liquid formulas should be made up of natural foods, not predigested or synthetic substances.

LIQUID REQUIREMENTS

To compensate for sweat losses, particularly in hot weather, the pre-event meal should include two or three cups of water or beverage to insure adequate hydration. These liquids should be readily absorbable and low in fat content (hence the need to use skim milk). The salt content is important and must be neither too little (resulting in the low sodium syndrome) nor too much (making the athlete thirsty).

Some beverages which may be included in the pre-event meal, if the individual has not experienced any previous discomfort from drinking them, are:

Skim milk
Apple juice
Lemonade
Limeade
Orange juice (perhaps diluted)
Pineapple juice (perhaps diluted)
Clear beef or chicken broth*
Bouillon*
Consomme*

* Source of sodium (salt); no calories

Since the pre-event meal is eaten three to four hours before the event, another cup of water may be taken about one and a half hours before participation. This still permits time for elimination of excess fluid before competition.

MISCONCEPTION: Tea is the preferred pregame beverage.

FACT: *The caffeine content of tea could be enough to further stimulate the central nervous system in an athlete who may already be nervous and excited at the prospect of competition. Before competition, coffee and tea are not advisable at any age.*

ADJUSTMENTS FOR PROLONGED ACTIVITIES

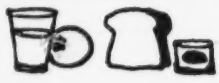
In prolonged or intermittent competition, athletes are sometimes faced with the problems of inadequate energy, dehydration, low salt syndrome,

and need for urinary and bowel elimination. Proper food
minimize these problems. Pre-event dietary measures
the regular daily eating program 48 hours before comp

PRE-EVENT MEAL PLAN I

(approximately 500 calories)

Milk, skim	1 cup
Lean meat or equivalent	2 oz.
Fruit	1 serving (½ cup)
Bread or substitute	2 servings
Fat spread	1 tsp.



Sample Menu 1

Milk, skim	1 cup
Slice of lean ham or other meat	2 oz.
Orange or other fruit	½ cup
Bread or toast	2 slices
Fat spread	1 tsp.

Sample Menu 2

Milk, skim	1 cup
Cheese sandwich: American or Swiss cheese	2 slices
Bread	2 slices
Fat spread	1 tsp.
Tomato juice	1 cup

Sample Menu 3

(Semiliquid) Milk, skim	1 cup + 3 tbsp. powdered skim milk
Custard:	
Milk, whole	1 cup
Egg	1
Sugar (flavoring, vanilla, salt)	1 tsp.
Orange juice	½ cup
Cooked cereal	½ cup
Sugar	2 tsp.

PRE-EVENT MEAL PLAN II

(approximately 900 calories)

Milk, skim	2 cups
Cooked lean meat or equivalent	2 oz.
Fruit	1 serving (½ cup)
Bread or substitute	4 servings
Vegetable	1 serving (½ cup)
Fat spread	1 tsp.
Dessert or other sweet	1 serving

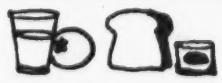
Sample Menu 1		**Sample Menu 2**
Milk, skim	2 cups	Milk, skim
Hamburgers	2 oz. patty	Creamed chicken
Potatoes, mashed	1 cup	
Bread	2 slices or 1 bun	Potatoes, mashed
Tomato juice	1 cup	Bread
Fat spread	1 tsp.	Green beans
Peach or other fruit	½ cup or 1 whole	Fat spread
Plain cookie	2	Orange or other fruit
		Angelfood cake

and need for urinary and bowel elimination. Proper food selection can help minimize these problems. Pre-event dietary measures begin by modifying the regular daily eating program 48 hours before competition.

MEAL PLAN I

ely 500 calories)

½ cup)



Sample Menu 2

Milk, skim	1 cup
Cheese sandwich:	
American or Swiss cheese	2 slices
Bread	2 slices
Fat spread	1 tsp.
Tomato juice	1 cup
Sugar (flavoring, vanilla, salt)	1 tsp.
Orange juice	½ cup
Cooked cereal	½ cup
Sugar	2 tsp.

PRE-EVENT MEAL PLAN II

(approximately 900 calories)

Milk, skim	2 cups
Cooked lean meat or equivalent	2 oz.
Fruit	1 serving (½ cup)
Bread or substitute	4 servings
Vegetable	1 serving (½ cup)
Fat spread	1 tsp.
Dessert or other sweet	1 serving

Sample Menu 1

Milk, skim	2 cups
Hamburgers	2 oz. patty
Potatoes, mashed	1 cup
Bread	2 slices or 1 bun
Tomato juice	1 cup
Fat spread	1 tsp.
Peach or other fruit	½ cup or 1 whole
Plain cookie	2

Sample Menu 2

Milk, skim	1½ cups
Creamed chicken	¼ cup diced chicken
Potatoes, mashed	1 cup
Bread	2 slices
Green beans	½ cup
Fat spread	1 tsp.
Orange or other fruit	½ cup or 1 whole
Angelfood cake	1 piece

Guidelines for Choosing Pre-Event Meals

Eat 3-4 hours before competition
Have a serving of roasted or broiled meat or poultry
1 serving of mashed potatoes or 1 baked potato **or ½ cup macaroni,** noodles, or the like
1 serving of vegetables
1 cup skim milk
1 teaspoon fat spread and 2 teaspoons jelly or other sweets
½ cup or a serving of fruit
Sugar cookies or plain cake — angelfood, sponge, white cake
Extra beverages 1-2 cups
Salt food well

REDUCING FOOD BULK

The end result of food is residue which makes up a part of the fecal bulk. Food intake can be adjusted to eliminate bowel movements temporarily. In the 48-hour period before competition, the following changes can be made to cut down on food residue.

Avoid	**Use**
Raw fruits*	Cooked fruit and vegetables**
Raw vegetables (except lettuce)	Fruit and vegetable juices (except prune juice)
Vegetables with seeds	Skim milk
Whole grain products	Enriched bread, rice, noodles, spaghetti, potatoes, macaroni
Relishes, popcorn, nuts	Roasted and broiled meats
Jams, preserves	Cheese
Gravy	Eggs (limited to 3 a week)
	Jellies, syrups, and other sweet spreads

* Oranges, peeled apple, banana are exceptions.

** Preferably these would not include berries and tomatoes because of the seeds and hulls.

GAME-TIME EATING

Sugar supplements seem to increase ability to continue performing in endurance events and to relieve fatigue, but apparently do not enhance performance in short events, as demonstrated by one study.

SOURCES OF QUICK ENERGY AT GAME TIME

Glucose is absorbed rapidly by the body and, after absorption, goes to the liver and then passes into the blood. The blood glucose level reaches a peak one-half hour or less after glucose has been taken and declines rapidly as glucose passes into the tissues. It is thus used by the body almost at once as a source of energy; it also restores glycogen in fatigued muscles and thus helps to increase endurance and prevent exhaustion.

Although pure glucose is the most readily available source of energy, table sugar and honey are both digested so rapidly that their glucose is available almost as quickly as pure glucose. Complex carbohydrates such as starches also break down to give glucose in the process of digestion, but at a slower rate.

MISCONCEPTION: Honey — the more the better — is the best source of quick energy.

FACT: *Honey contains two sugars: glucose and fructose. These are the same simple sugars that yield in digestion of table sugar (sucrose). Both honey and table sugar are digested rapidly, and their glucose is available to the body quickly. Honey is not significantly superior to other common sweets. Unfortunately, dietary quacks have falsely promoted honey as a sweet which they say is better tolerated than other sugars, even by diabetics.*

Excess amounts of glucose, dextrose pills, cubes of sugar, honey, or hard candy tend to draw fluid into the gastrointestinal tract from other parts of the body. This may add to the problem of dehydration in endurance sports, where sweat loss can affect performance.

A limited amount of sweetened liquid should not present this problem. Experienced athletes have pointed out the importance of such liquids being thirst-quenching or slightly tart. Canned or frozen fruit juices fill both these requirements. Furthermore, they already contain sugar — glucose, fructose, sucrose, and other forms of carbohydrate.

Fruit juices and ades are also good sources of quick energy, although tolerance of fruit juice and fruit ades will vary with the individuals. Ade is a fruit juice beverage diluted with water or a soft drink, noncarbonated, but with a fruit flavor added.

Juices containing about 30 grams carbohydrate	**Juices containing about 35 grams carbohydrate**	**Juices containing about 40 grams carbohydrate**
(1 cup)	(1 cup)	(1 cup)
Lemonade (frozen sweetened)	Pineapple juice	Sweetened cranberry juice
Limeade (frozen sweetened)		Grape juice (bottled or canned)
Orangeade		
Orange juice		
Orange and grapefruit juice		
Apple juice		
Grapefruit juice (frozen sweetened)		

Natural Sources of:

Glucose	**Fructose**	**Sucrose**	**Lactose**
Grape sugar	Fruits	Cane sugar	Milk sugar
Corn sugar	Honey		

POSSIBLE SUGAR OVERDOSAGE

The body may rebel if sugar intake is too high. A concentrated sugar solution (a hypertonic solution) may cause extra distention in the stomach, and evacuation mechanisms may be impaired. The reaction of the small intestine may take the form of cramps, nausea, and distention. Another possibility is that too much carbohydrate may enhance fermentive activity of intestinal bacteria and may result in gas and diarrhea in some individuals. These problems are more apt to occur when the sugars used are concentrated amounts of glucose and dextrins.

Although some literature on nutrition in sports places a limit of 150 grams on sugar intake at any one time, even this amount may cause distress in some instances. Since absorption proceeds more rapidly than the muscles can use the sugar, it seems better to take small amounts at frequent intervals; 50 grams (200 calories) each hour will provide a valuable supplement to the energy available in body stores. It should be given in diluted solution, since fluid in the digestive tract is necessary for absorption.

Use of Quick Energy Sources at Event Time

- Quick energy foods do not seem to improve performance in short-term events.
- Energy supplements do seem to aid performance in endurance events.
- Energy from sugar begins to be available within minutes of being consumed.
- No more than 50 grams sugar (3 rounded tablespoons) in a liquid should be taken at any one-hour lapse.

POSTEVENT MEALS

The feeling of exhaustion comes after any athletic competition, but particularly after the longer events. The body has not reverted to normal and is not ready to take on the job of digesting food. It takes time for an appetite to develop after strenuous exercise. Complete relaxation does much to return an athlete to a nonstress situation where he is ready to enjoy eating again. For this reason, the only nourishment which may be advisable immediately following competition is a liquid, such as fruit juice.

Later, when the individual feels like eating, any good-sized balanced meal may be selected. Many athletes do not want to eat much after competition, but when they do feel like eating, they are famished. In some cases, this is late in the evening, and snacks, sandwiches, fruit, and milk for this late evening meal are usually relished.

ROAD TRIPS

The high school team taking a trip for a game has the problem of finding a place to eat on the way home. The college team visiting a small college having no training table is left to its own resources; knowing that their athletic department will pick up the tab, team members are apt to overeat. The team traveling across the country by chartered airplane must depend on the food services of the airlines.

Advance planning of meals to be served, development of a routine, and keeping things as normal as possible help to make road trips more pleasant.

Some ideas about ways to obtain food are these:

High School Trips

1. Team members bring sack lunches from home.*
2. Sack lunches are prepared by the school cafeteria.

*Because of lack of refrigeration, to avoid possible food poisoning, sandwiches should not be made from mixtures, but rather from sliced cheese and peanut butter.

3. The coach makes prearrangements with an eating place and orders a specific meal for the entire team.

College and University Trips

1. If the school visited has no training table, the coach may arrange the menu for the entire team at a residence hall or local restaurant.
2. If hotel meals are included, the athletic department should send advanced instructions, specifying the time of meals and what menus should be used as weli as portion sizes where necessary.

Touring athletes are often on their own when it comes to meals. How well they fare depends upon their own initiative, their coach's instructions, their budget, and their nutritional knowledge. It is possible, with good instruction and a little advanced planning, to meet food needs wisely under these circumstances.

MEAL PATTERNS

Preseason conditioning, two-a-day workouts — any situation where exercise is long and hard — may mean changing meal patterns to avoid possible discomfort. The first days of football practice offer an example. Nausea, vomiting, and severe stomach cramps during scrimmage may be expected; they are usually attributed to lack of conditioning. However, stomach upsets are less apt to occur if meal patterns are appropriate. For example, if there is morning practice, breakfast should be eaten one to two hours beforehand and should be light (consisting, perhaps, of fruit juice, cereal, toast, and milk).

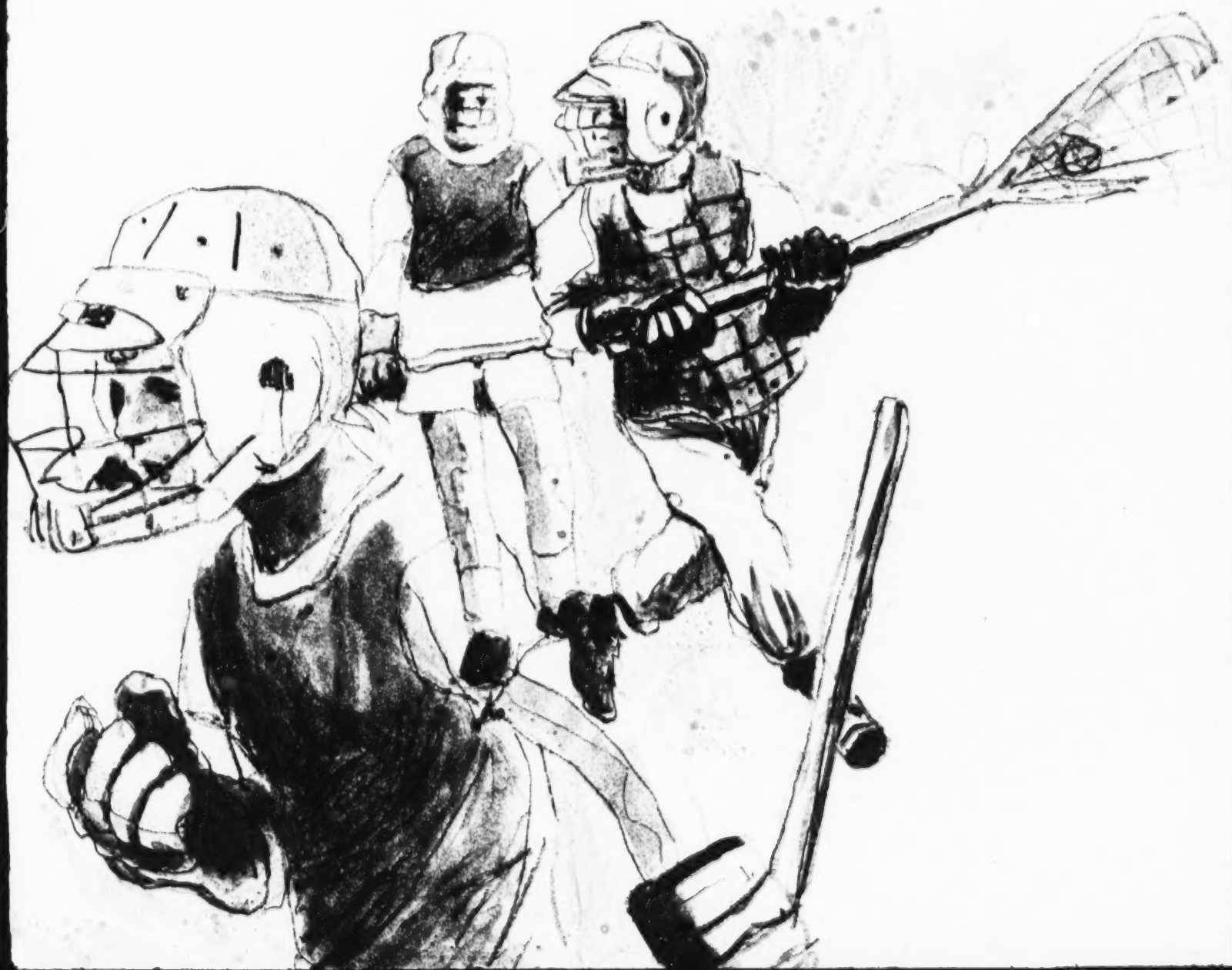
Swimmers sometimes have to train at odd hours. Where public pools are used, morning workouts may come at dawn. Here, too, a light breakfast an hour or two beforehand will supply the energy for practice without causing distress.

If practice is scheduled for early afternoon, a big breakfast is fine. Lunch, then, should be the light meal.

If practice sessions are at night (as are many community organized athletic events), then a big breakfast and lunch, a light supper, and a hearty snack later in the evening would be preferred.

Right after practice, a source of quick energy helps take away the feeling of exhaustion. Fruit juice or fruit ade drinks are suitable. They may be sent to the locker room for consumption immediately after practice. Between meal or late evening snacks are also helpful to maintain appropriate meal patterns and provide proper food totals for the day.

SECTION IV DIETARY SUPPLEMENTS



Dietary supplements are not usually necessary if there are no shortages in the daily food lineup. They do not add to the performance of the athlete and are expensive. They will not correct faulty food habits, and overdoses of certain supplements can be dangerous.

Excess intake of vitamin A, for example, can result in defects in metabolism, since the body has no pathways for its excretion. Vitamin A is stored in the liver and, because it is not excreted in the urine, it accumulates in the body; in excessive amounts it can produce deleterious effects. The body needs no more than about 5,000 IU of vitamin A, and this amount can easily be obtained from common foods.

In the long run, it is not only possible but safer, cheaper, and easier to adjust food intake to meet the body's nutrient needs. The young athlete can assess weaknesses in his food intake by referring to the daily meal schedules and scoreboards. Analysis of his food intake will show the shortages in his diet, and with this knowledge, improvements in food habits which may last a lifetime can be made.

Any product hailed as increasing capacity for performance is destined to receive attention in the world of sports. The coach's problem is to find out what "experts" are presenting information about these products and how reliable their claims are. Then comes the obligation of educating young athletes to an understanding of the facts.

Presented below are brief summaries of the opinions of researchers and specialists in nutrition on the effectiveness of some of the so-called aids to performance.

MINERALS

Magnesium and potassium. There have been several reports that the potassium and magnesium salts of aspartic acid increase endurance by

reducing fatigue at the neuromuscular level. Studies made for the U.S. Army showed that the aspartate salts failed to influence the performance of men and animals.

VITAMINS

Giving vitamins in excess of accepted standards is practiced on the theory that they will supercharge energy-producing reactions in the body. This is not the case. The accepted standards for vitamin intake — the recommended dietary allowances of the National Research Council — are listed on page 9.

Vitamin A. There is little evidence that muscular function has any direct and immediate relation to vitamin A intake. The dark green and deep yellow vegetables, as well as liver, eggs, and cheese in the daily food lineup serve to supply the Recommended Daily Allowances.

B-complex vitamins. Thiamine, riboflavin, niacin, and vitamin B12 have important roles in many of the reactions which make energy available for muscular work. When work increases, as in endurance sports, the need for B-complex vitamins increases. However, researchers in the country conclude that there is no evidence that athletic performance is improved by supplementing a nutritionally adequate diet with B-complex vitamins.

Actually, a greater intake of these vitamins is guaranteed by increasing the food on the daily food lineup and selecting foods that are the richest sources, such as: enriched breads, cereals, milk, eggs, and meat — especially liver and pork.

What happens when large doses of B-complex vitamins are taken?

Thiamine: There are no means for storing this vitamin. The excess is excreted in urine.

Riboflavin: The daily food lineup will supply approximately 3 mg of riboflavin. The quart of milk and 5-7 ounces of meat will supply approxi-

mately 1.94 mg. The enriched bread also serves as another major source of this vitamin.

Niacin: Since the body synthesizes niacin from the amino acid tryptophan, a generous intake of animal protein provides a safety factor.

Vitamin B_{12}: Much of this vitamin is excreted in the urine.

Vitamin C. Most of the research carried on in this country indicates that muscular performance is not affected by adding excess vitamin C (ascorbic acid) to the diet.

FACT: *Vitamin C is necessary to make the "cementing" substance collagen, which helps hold body cells together. This cementing substance also aids in the formation of strong scar tissue, important for successful wound healing. In this way it helps resist infection. There is no evidence proving that excess vitamin reduces the likelihood of bruising, or that it acts in any way to minimize or prevent athletic injuries. On the other hand, there is no evidence that a moderate excess poses a physiological hazard.*

When young athletes drink one 4-ounce glass of orange juice a day, their food intake will contain at least 40 mg of vitamin C. Other fruits and vegetables in the daily lineup can be expected to add approximately 20 mg, making the total 60 mg of vitamin C as in the Recommended Daily Dietary Allowance for the 18-22 year old male.

Vitamin E and Wheat Germ Oil. Strong claims have been made for these dietary supplements in improving endurance. However, there has been no demonstration of the beneficial effects of supplemental vitamin E. The daily food lineup provides about 24 mg of vitamin E (tocopheral). Richest sources are vegetable oils, whole grains, and eggs. There is no evidence that the vitamin is toxic, even at high levels.

MISCONCEPTION: Wheat germ containing vitamin E provides increased energy but no calories.

FACT: *Dietary supplements of vitamin E do contain calories. One-quarter cup wheat germ provides about 60 calories. One tablespoon wheat germ oil contains 125 calories.*

The menu plans outlined in this handbook were designed to meet the recommended daily dietary allowances in the United States. Following is a table of daily vitamin content of these meals.

Calorie Diet	Vitamin A	Thiamine	Ribo-flavin	Niacin	Vita-min C	Vita-min E
	IU	mg	mg	mg	mg	mg
2500	4500	1.3	1.3	17	40	20
2700	5000	1.4	1.4	18	45	20
3000	5000	1.5	1.5	20	55	25

GELATIN

Desserts made with gelatin are popular in training diets and pre-event meals. These desserts are sources of extra calories because of the sugar they may contain. However, gelatin is not a preferred protein food because it does not contain all the essential amino acids needed for growth, repair, and maintenance of the body.

Gelatin has been credited with increasing muscle power and relieving fatigue because it contains glycine (aminoacetic acid). Endurance tests have shown no benefit from the use of either glycine or gelatin. Furthermore, the protein in the daily food line-up supplies all the glycine that is needed.

EVALUATING NUTRITIONAL CLAIMS

Food misinformation that is the outgrowth of tradition and ignorance is one thing; food misinformation created and played up for profit is another. Facts may be distorted by clever use of words and phrases commonly associated with the science of nutrition. Statements taken from or alluding to scientific reports are misleading when included out of context in leaflets and literature. As a result of false advertising, products are tried in efforts to find the answers to peak performance.

There is, of course, the possibility that eventually some effective and safe means of enhancing performance or relieving fatigue will be found as more is learned about energy metabolism.

SOURCES OF PROFESSIONAL ADVICE ON DIET

Feeding athletes can be a pretty tremendous job! Coaches and trainers probably have more influence on the food intake of sports-oriented teenagers and young adults than parents or anyone else. Since they may not have time to evaluate all the new supplements and new ideas about diet as they come along, to combat fads and to provide basic nutritional education the coaches and trainers should call on their professional colleagues.

Team physicians are alerted to the problems and are aware of areas where effective and reliable research is being done. Health educators are conscious of the need to teach correct and sound information about foods and nutrition. At the college and university level, still further assistance can be obtained from members of the department of nutrition and the dietitians in the residence halls. At the high school and junior high school levels, qualified school lunch administrators, school nurses, and home economics teachers can be helpful. Public health nutritionists from the city, county, or state boards of health, as well as local hospital dietitians, have contributions to make. As experts in applied nutrition they will be pleased to conduct classes or seminars on food and nutrition for both students and coaches.

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